

Appln. No. 10/507,207
Reply to Office action of May 23, 2005
Response dated November 21, 2005

REMARKS

This paper is submitted in response to the Office Action mailed August 10, 2005 for the above-identified patent application. Applicants respectfully request a 3-month extension to the time for filing this response. Payment of the extension fee is to be made according to the Credit Card Payment Form attached herewith.

Claims 1 and 2 are pending in the application and have been rejected. Applicants have amended independent claim 1 to recite "55 to 90 wt% clay" and "4 to 35 wt% blast furnace slag. No new matter has been added. Therefore it is respectfully submitted that, as amended, pending claims 1 and 2 are now in a condition for allowance.

The Examiner has rejected claims 1 and 2 under 35 U.S.C. 102(b) as anticipated or, in the alternative, under 35 U.S.C. 103 as obvious over Derwent Abstract No. 2000-348550 corresponding to Russian Patent Application No. 2133233 C1 to Kalashnikov *et al.* ("Kalashnikov").

The Examiner alleges that Kalashnikov discloses a binder composition with a moisture content of 8-14% and comprises: 30-50% clay; 5-10% lime; 0.6-1% sodium hydroxide; and the balance metallurgical production slag. The Examiner states that the amounts disclosed in the abstract overlap and/or encompass the amounts presently claimed. Moreover, the Examiner alleges that blast furnace slag is encompassed by the term "metallurgical slag" or would be an obvious variant, absent evidence of unexpected results.

Applicants respectfully traverse the rejections of claims 1 and 2. Kalashnikov discloses a binder composition with 30-50% clay, 5-10% lime, 0.6-1% NaOH and the

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balance (39 –65%) slag. In contrast, as currently amended, the present invention claims a composition comprising 55-90% clay, 2-30% lime, and 4-35% slag. Thus, Kalashnikov does not disclose each and every element of the presently claimed invention, as required to establish a *prima facie* case of anticipation or obviousness.

Furthermore, in view of the teaching of Kalashnikov of not more than 50% clay, one skilled in the art would not have been motivated to provide a composition that includes more than 50% clay, as recited in the present invention. As the amount of clay is increased, the amounts of slag, lime and alkali, which serve as bonding materials, are drastically decreased. Thus, the composition of Kalashnikov is prepared using bonding materials, such as slag, lime, and alkali, as the main components, while the present invention includes greater amounts of clay and minimizes the amounts of bonding materials. Typically, increasing the amount of clay drastically deteriorates the performance of the composition. Thus, one skilled in the art would not be motivated to develop a clay composition by increasing the amount of clay, and decreasing the amount of bonding materials (e.g., slag, lime and alkali), to provide excellent strength and durability.

Further, the use of a large amount of clay typically results in varied physical and chemical properties of the composition. Only the chemical bonding of the clay and slag is emphasized in Kalashnikov. In contrast, the present invention improves the performance of the composition using not only the chemical bonding of the composition but also the physical and chemical properties of the clay, including origins, structure, density, pores, constriction, expansion, agglomeration, adhesion, etc. Thus, the present

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invention overcomes the limitations described above by providing a composition that comprises a greater amount of clay and smaller amounts of bonding materials, which is not taught or suggested by the disclosure of Kalashnikov.

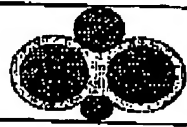


Moreover, the composition of the present invention does not require the use of a stimulative alkali, such as NaOH, which is an essential component of Kalashnikov. Thus, the composition of the present invention may include only a minimum amount of an alkaline chemical, which is hazardous to the human body.

With respect to water content, the composition of Kalashnikov is in a semi-dried state having 8-14% water. In contrast, the composition of the present invention includes optimum water content of about 5-8%. Excess water in the composition will evaporate over time and form pores in the composition, resulting in reduced strength. Thus, it is preferable that only a minimum amount of water, sufficient for a hydration reaction, is included in the composition. Although the strength of the composition can be increased by sufficient vibration and pressure, if the vibration and pressure are insufficient, other mechanical methods will be needed to minimize the water content within the range needed for a hydration reaction.

As shown below, when the water content is 14-50%, as in conventional compositions (A), the product can be freely molded in a fluid state. However, gaps between particles are too large, and thus the size of internal pores is increased and the reactivity is decreased, resulting in remarkably decreased strength. On the other hand, in the composition of Kalashnikov (B), when the water content is 8-14%, the composition must be compressed using mechanical energy to drastically reduce the water content.

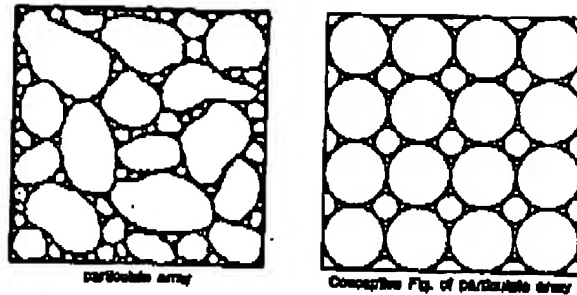
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However, excess water may still remain, resulting in a composition that cannot be effectively used. In the present invention (C), the composition comprises only 5-8% of water and, therefore, mechanical energy may be effectively applied and air removed from the pores of clay, thus increasing unit weight and strength. Thus, the present invention provides a composition with optimum water content that functions to exhibit lubrication properties, whereby the positions of the clay particles are moved, leading to high density and strength.

TYPE	Particle status	Water content
A (conventional)		14-30%
B (clay particles)		8-14%
C (present invention)		5-8%

In addition, Kalashnikov discloses the use of clay composed of only fine minerals. In contrast, the present invention comprises earth, which comprises a mixture of sand, silt and clay. According to International Society of Soil Science, "clay" refers to rock or minerals having a particle size not larger than 0.002 mm, while "earth" is defined as a mixture comprising particles having different sizes as weathered rock fragments. Thus, the particles used in the present invention have various sizes ranging from 5 mm to 0.002 mm or less. Accordingly, the particles having different sizes act to occupy spaces to provide high density and a micro filter effect, thus improving the physical performance.

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Thus, the present invention provides a composition in which the water content and component ratio of the composition are optimally controlled to provide high strength, durability and stability. For example, the composition of the present invention allows the use of a molding process that can provide improved performance even though the quality of the composition is difficult to control. In addition, the present invention provides a composition that may use a steam curing process at 30-90°C for 1 hr and gradually decreased for the residual time. In contrast, Kalashnikov discloses that the curing process is conducted at room temperature or a constant temperature (50°C) for 10-11 hr. A steam curing process is advantageous because it produces a composition with increased strength in a short amount of time. Therefore, high strength, which is conventionally achieved by curing for a long period of time, can result within a short time. Thus, the present invention provides a composition that may be molded into a product after optimum curing conditions to provide a product with improved performance.

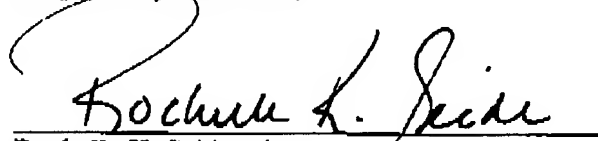
For at least these reasons Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1 and 2 under 35 U.S.C. 102(b) as anticipated or, in the alternative, under 35 U.S.C. 103 as obvious over Kalashnikov.

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In view of the foregoing, Applicants respectfully submit that pending claims 1 and 2 are now in a condition for allowance. Prompt consideration and allowance are therefore respectfully requested.

Applicants believe that no additional fees are required in connection with this response. However, if additional fees are required, the Commissioner is hereby authorized to charge any additional payment, or credit any overpayment, to Deposit Account No. 01-2300, referencing Docket Number 101190.00042.

Respectfully submitted,



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FEE CALCULATION

Any additional fee required has been calculated as follows:

☒ If checked, "Small Entity" status is claimed.

	(Column 1)	(Column 2)	(Column 3)	SMALL ENTITY			LARGE ENTITY	
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NO. PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE	ADD'L FEE	OR	RATE	ADD'L FEE
TOTAL CLAIMS	2 MINUS	20	= -0-	x \$25	\$0.00		x \$50	\$
INDEP CLAIMS	1 MINUS	3	= -0-	x \$100	\$0.00		x \$200	\$
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEP. CLAIM				+ \$180	\$0.00	OR	+ \$360	\$
					\$0.00			\$

The U.S. Patent and Trademark Office is hereby authorized to charge and deficiency or credit any overpayment of fees associated with this communication to Deposit Account No. 01-2300 referencing docket number 101190.00042.